6.03 Dollar Value LIFO

In certain industries, inventory is measured at current prices with increases added to the historical cost of beginning inventory, using current prices, and decreases measured on the basis of the most recent goods purchased, at their historical cost.

- Inventory is measured in terms of dollars, not units, and is adjusted for changing price levels.
- Inventory is combined into natural groups called "Inventory Pools" and each pool is valued separately. A price level index is used to convert the inventory value from LIFO to Dollar-value LIFO.

For most companies, the inventory method best matching their pricing policy is LIFO. Most companies price goods for sale based on replacement cost, and LIFO results in the most recent purchases being treated as cost of sales, coming closest to replacement cost of all GAAP methods.

Nevertheless, there are **two potential difficulties** that arise from the application of the LIFO method:

- The company needs to keep track of the different unit costs for items acquired on different dates, going all the way back to the date the company first adopted the method, which could be the date the company was founded. This need to keep cumulative accurate records will result in increasing record-keeping costs over time. When a client has several different types of products in its inventory, the **costs can be enormous**.
- When inventory levels decline temporarily, older costs previously inventoried will become a part of cost of goods sold, causing a distortion of that account if there have been substantial price changes over time. This is because the unit costs in inventory that are several years old are likely to be radically different from the approximation of replacement cost represented by the most recent purchases.

A useful solution is a method known as **Dollar-Value LIFO (DV LIFO)**. Under this approach, related inventory items are grouped in **pools**, and an overall price index is used to approximate changes in inventory costs. It addresses both difficulties mentioned above:

- It is only necessary to **keep track of annual layers** of inventory cost and price indexes for each inventory pool, instead of retaining detailed records of each unit cost of each item purchased over the life of the company. As a result, the record-keeping costs of this method are substantially lower than traditional LIFO.
- Since related items are grouped together and layers are computed annually, reductions in the level of a certain type of item in inventory that are offset by increases in the level of other items in the pool, or reductions at interim periods that are compensated by year-end, won't result in the use of older costs in the calculation of cost of goods sold (COGS). As a result, this method substantially reduces the probability that older inventory layers will be liquidated and reported in COGS.

To apply the DV LIFO method, **two figures are needed**:

- The **total current cost** of the inventory in the pool at the end of each year (this would usually be the replacement cost or the ending inventory under a FIFO approach).

- A **price index** indicating the overall price level compared to the base date (the date the method was first adopted).

Dollar Value LIFO

Beginning inventory (BI) = 2 pens @ $1 = $2
Ending inventory (EI) = 3 pens @ $1.20 =$3.60
} $1.60 Difference

Price Level Index = 1.20 → 20% Inflation

$$\frac{\text{EI}}{\text{Inflation Factor}} = 3.60/1.20 = \textbf{\$3 EI @ base year \$}$$

→ **$3** = EI @ beginning of year prices OR base year $ (Base Year = Year started DV LIFO)

Adding Layers	$3 =	EI @ beginning of year prices OR Base Year $
	(2) =	Subtract Base
LAYER	$**1** =	Increase in inventory @ base year $
	× 1.20 =	Multiply by inflation factor
LAYER	**1.20** =	Layer @ current costs
	+ 2.00 =	Still around (old inventory) @ base cost
BASE	**3.20** =	EI @ current cost

Year	Inventory @ Y/E $ ÷	Price level Index	EI @ Base Year $	Add'tl Layer	X2 (1.0)	X3 (1.2)	X4 (1.3)	X5 (1.4)	X6 (1.5)
X2	$2.00	1.0	$2.00		$2.00				
X3	3.60	1.2	3.00	$1.00		$1.00 0.90			
X4	4.30	1.3	3.30	0.3			0.30		
X5	4.06	1.4	2.90	(0.4)				0 (0.40) Sold	
X6	5.25	1.5	3.50	0.6					0.60
					$2.00	$1.20	$0.39		$0.90

What you sold comes out of LIFO

- **Price level index (approaches)**
  - Simplified (CPI for your industry – given)
  - Link chain (single cumulative index, compare with previous year)
  - Double extension (extend back to base year)

- **Ending inventory**
  - X2 = $2.00 — 2 × 1.0
  - X3 = $3.20 — 2 + 1.2 (1 × 1.2)
  - X4 = $3.59 — 2 + 1.2 + .39 (.3 × 1.3)
  - X5 = $3.08 — 2 + 1.08 (.9 × 1.2)
  - X6 = $3.98 — 2 + 1.08 + .9 (.6 × 1.5)

For example, assume that the method was adopted on 12/31/X1, and the following facts applied to the first year in which the method was applied:

Date	Current Cost (CC)	Price Index (PI)
12/31/X1	$1,000	1.00
12/31/X2	$1,320	1.10

Notice that the price index is automatically set at 1.00 on the date the method is adopted, and the above information indicates that prices increased by 10% in 20X2.

Our first step is to determine if inventory rose or fell after eliminating the effects of price changes. We do this by factoring out inflation, which is accomplished by dividing the current cost by the price index each year:

Date	Current Cost	Price Index	Base Cost (BC)
12/31/X1	$1,000	1.00	$1,000
12/31/X2	$1,320	1.10	$1,200

In a sense, we can think of the price index as the unit cost of the items, not in physical units but in units of base cost. Thus, at the end of 20X1 (beginning of 20X2), the company held 1,000 base units at $1.00 each, and at the end of 20X2, the company held 1,200 base units at $1.10 each, so that the inventory went up in real terms by 200 base units, or 20%. The rest of the increase in the dollar value of inventory was the result of inflation.

Once the increase at base cost is computed, it must be adjusted back to current prices, since the increase occurred in the current year. This results in different layers of inventory at different price indexes:

Date	CC	PI	BC	Layer	PI	DV LIFO
12/31/X1	$1,000	1.00	$1,000	$1,000	1.00	$1,000
12/31/X2	$1,320	1.10	$1,200	$200	1.10	$220
Total						$1,220

If inventory at current cost is $1,560 at 12/31/X3, and the price index has increased to 1.20, representing 20% of cumulative inflation since 12/31/X1, the next year's computation is as follows:

Date	CC	PI	BC	Layer	PI	DV LIFO
12/31/X1	$1,000	1.00	$1,000	$1,000	1.00	$1,000
12/31/X2	$1,320	1.10	$1,200	$200	1.10	$220
12/31/X3	$1,560	1.20	$1,300	$100	1.20	$120
Total						$1,340

Finally, if inventory declines in 12/31/X4 to a current cost of $1,430 while the index rises to 1.30, we will be removing some of the layers from the previous years as follows:

Date	CC	PI	BC	Layer	PI	DV LIFO
12/31/X1	$1,000	1.00	$1,000	$1,000	1.00	$1,000
12/31/X2	$1,320	1.10	$1,200	$100	1.10	$110
12/31/X3	$1,560	1.20	$1,300			
12/31/X4	$1,430	1.30	$1,100			
Total						$1,110

Compare this table to the previous one, and notice that, to account for the $200 decline at base cost from $1,300 to $1,100, we removed the 20X3 layer of $100 at 1.20, and then removed $100 from the 20X2 layer at 1.10, leaving the layers noted in the last chart.

In all the examples so far, the price index has been provided. There are **three different methods** for arriving at an index:

- **Simplified**
- **Double Extension** (extend back to base year)
- **Link-Chain** (cumulative index, compare with previous year)

The **Simplified** method refers to the use of a generally available index of prices, typically a government index such as the Consumer Price Index for Urban Consumers (**CPI**).

The **Double Extension method** requires the client to count the inventory and then extend inventory prices twice (which is the reason the term "double" is used). Then the two results are compared to determine a price index:

- Current Quantity × Current Unit Cost = Current Cost
- Current Quantity × Base Date Unit Cost = Base Cost
- Current Cost / Base Cost = Price Index

Notice that the three numbers calculated are the same three figures as in earlier examples. The difference is that the earlier examples used Current Cost / Price Index = Base Cost, but since division is transitive (if A / B = C then A / C = B), either approach is acceptable.

Let's look at an example of computing the index using the double extension method. Assume a company has two products, X and Y, with the following inventory quantities and unit costs at the end of each year:

Year	X Quantity	Y Quantity	X Unit Cost	Y Unit Cost
20X1 (base)	26	12	$20	$40
20X2	30	15	$26	$44
20X3	36	18	$28	$64

The 20X3 current cost and base cost amounts are computed as follows:

Product	Quantity	Unit Cost	Total Cost	Aggregate
X	36	$28	$1,008	
Y	18	$64	$1,152	
Current Cost				$2,160
X	36	$20	$720	
Y	18	$40	$720	
Base Cost				$1,440

The index for 20X3 is then $2,160 / $1,440 = 1.50

The **Link-Chain method** is similar to the Double Extension method, except that year-to-year price changes, rather than cumulative changes, are computed, then the annual changes are linked (multiplied) together to determine a price index. To determine the year-to-year changes, the calculation is:

- Current Quantity × End-of-year Unit Cost = Current Cost
- Current Quantity × Start-of-year Unit Cost = Prior Year Cost
- Current Cost / Prior Year Cost = Annual Cost Index

For example, use the same facts as in the previous example:

Year	X Quantity	Y Quantity	X Unit Cost	Y Unit Cost
20X1(base)	26	12	$20	$40
20X2	30	15	$26	$44
20X3	36	18	$28	$64

The 20X2 annual index calculation is:

Product	Quantity	Unit Cost	Total Cost	Aggregate
X	30	$26	$780	
Y	15	$44	$660	
Current Cost				$1,440
X	30	$20	$600	
Y	15	$40	$600	
Prior Cost				$1,200
Annual Index				1.20

The 20X3 annual index calculation is:

Product	Quantity	Unit Cost	Total Cost	Aggregate
X	36	$28	$1,008	
Y	18	$64	$1,152	
Current Cost				$2,160
X	36	$26	$936	
Y	18	$44	$792	
Prior Cost				$1,728
Annual Index				1.25

The price index for 20X3 is the result of linking these indexes together:

Year	Annual Cost Index	Overall Price Index
20X1		1.00
20X2	1.20	1.20
20X3	1.25	1.50

The overall price index at the end of 20X3 is the result of multiplying the annual cost indexes for 20X2 and 20X3 (1.20 × 1.25 = 1.50).